

Société Anonyme called: L'ORÉAL

Long-retention hairstyling gel

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### Long-retention hairstyling gel

The present invention relates to a cosmetic composition thickened by a combination of at least two thickening polymers, and the use of this composition for hairstyling.

Hairstyling gels are solutions of one or more fixing film-forming polymers thickened or gelled by one or more thickening polymers.

Although a very large number of fixing polymers are known in the hairstyling field, most of them have a fixing power which is limited over time and which is poorly resistant to moisture.

The highly advantageous hairstyling properties of a particular group of branched block copolymers were recently discovered.

These copolymers, used in hairstyling compositions, exhibit a combination of physicochemical and cosmetic properties which make them excellent fixing polymers. Thus, these block copolymers spread easily on the hair, exhibit good adhesion to the hair fibres, give a scarcely sticky feel, are easy to remove with a shampoo and give satisfactory fixing of good elasticity which is stable over time and which is particularly resistant to moisture.

However, it has been observed, during the formulation of hairstyling gels, that these novel polymers had the disadvantage of considerably fluidifying most conventional thickening systems such as for example those based on

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acrylic copolymers or homopolymers.

An increase in the viscosity of the composition by increasing the concentration of the thickening polymer is found to be unsatisfactory because of the poor qualities of using the gel which result therefrom, such as a pasty and sticky consistency and some difficulty in spreading and applying the gel.

A need therefore exists for a thickening system capable of satisfactorily thickening or gelling a hairstyling composition based on the novel fixing copolymers indicated above.

The applicant has found, after long research work, a particular combination of thickening polymers which make it possible to overcome the problems of fluidification and alteration of the properties of using the gel which are disclosed above.

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The subject of the present invention is consequently cosmetic compositions containing in a cosmetically acceptable carrier

- (a) at least one fixing film-forming polymer chosen from branched block copolymers comprising, as principal monomers, at least one C<sub>1-20</sub> alkyl acrylate and/or at least one N-mono- or N,N-di(C<sub>2-12</sub> alkyl)(meth)acrylamide, and acrylic acid and/or methacrylic acid,
- (b) at least one thickening agent chosen from homopolymers and copolymers based on (meth)acrylic acid, which are crosslinked or noncrosslinked, and

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- (c) at least one cothickening agent chosen from noncellulosic thickening polymers different from (b).

The subject of the invention is also the use of the above thickening or gelled cosmetic compositions for styling and fixing the hair.

The fixing film-forming polymer (a) used in the cosmetic compositions of the present invention is a branched block copolymer having a structure consisting of hydrophobic blocks onto which a certain number of more hydrophilic blocks are attached in particular via bifunctional units. These copolymers have at least two glass transition temperatures.

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They are in particular described in patent application W000/40628 whose content forms an integral part of the present application.

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The branched block copolymers described above are provided for example under the names EX-SDR-26<sup>®</sup> and EX-SDR-45<sup>®</sup> by the company GOODRICH.

These copolymers have the following composition:

acrylic acid 26 to 36 mol%

n-butyl acrylate 27.5 to 30.5 mol%

methacrylic acid 33.3 to 45.3 mol%

allyl methacrylate 0.48 to 0.92 mol%

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The most hydrophobic blocks have a molecular weight of 10,000 to 100,000 and the most hydrophilic blocks have a molecular weight of 1000 to 100,000 daltons.

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The above fixing film-forming polymers are preferably used in anionic form, that is to say in the form of a salt resulting from the partial or complete neutralization of the (meth)acrylic acid groups. The neutralizing agent may be any physiologically acceptable inorganic or organic base which does not interfere in a disadvantageous manner with the thickening system. There may be mentioned, by way of example of a preferred neutralizing agent, 2-amino-2-methyl-1-propanol or sodium hydroxide.

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The cosmetic compositions of the present invention generally contain between 0.1 and 10% by weight, and preferably between 1 and 5% by weight of fixing film-forming polymer, relative to the total weight of the final composition.

The thickening system used in the cosmetic compositions of the present invention necessarily comprises

- (b) at least one thickening polymer based on (meth)acrylic acid, and
- (c) at least one noncellulosic thickening polymer (cothickening agent), different from (b).

The thickening polymer (b) is chosen from poly(acrylic acid), poly(methacrylic acid), copolymers of acrylic acid and methacrylic acid, copolymers comprising units derived from acrylic acid and/or methacrylic acid as well as units derived from other acrylic or vinyl monomers such as C<sub>1-30</sub> alkyl acrylates, C<sub>1-30</sub> alkyl methacrylates, vinyl acetate.

These acrylic homopolymers or copolymers may also be crosslinked.

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They are used in a form which is partially or completely neutralized with a physiologically acceptable organic or inorganic base.

In a preferred embodiment of the invention, the polymer (b) is a crosslinked homopolymer of methacrylic acid or of acrylic acid.

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There may be mentioned by way of examples of such polymers those marketed by the company GOODRICH under the names Carbopol® 940, Carbopol® 941, Carbopol® 980, Carbopol® 981, Carbopol® ETD 2001, Carbopol® ETD 2050, Carbopol® 2984, Carbopol® 5984 and Carbopol® Ultrez 10, by the company 3V under the names Synthalen® K, Synthalen® L and Synthalen® MS, and by the company PROTEX under the names Modarez® V1250 PX, Modarez® V2000 PX, Viscaron® A1600 PE and Viscaron® A700 PE.

In another preferred embodiment of the invention, the thickening agent (b) is a copolymer of acrylic acid or of methacrylic acid and of a C<sub>10-30</sub> alkyl acrylate or methacrylate.

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Such copolymers are marketed for example by the company GOODRICH under the names Carbopol® 1342, Carbopol® 1382, Pemulen® TR1 and Pemulen® TR2.

The concentration of thickening agent (b) in the cosmetic compositions of the present invention is preferably between 0.1 and 3% by weight, and in particular between 0.2 and 2% by weight, relative to the total weight of the final composition.

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For the production of a satisfactory thickening effect, that is to say for the production of a viscosity which is at least equal to 50 deviation units on a RHEOMAT 180 viscometer, rotor 3 (25°C, reading after 30 seconds), that is about 1.9 Pa.s, this first thickening constituent (b) should be combined with a second constituent (c) playing the role of cothickening agent.

This cothickening agent is chosen from thickening polymers different from the thickening agents (b), excluding the cellulosic thickening polymers.

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According to a preferred embodiment of the present invention, this cothickening agent (c) is a polymer of noncellulosic natural origin.

There may be mentioned by way of thickening polymers of natural origin which can be used as cothickening agents guar, xanthan, scleroglucan, gelan, rhamsan and karaya gums, alginates, maltodextrin, starch and its derivatives, and carob flour, and the use in particular of guar gums such as that marketed under the name Jaguar® HP105 by the company RHODIA, or the xanthan gums such as those marketed under the names Keltrol® and Kelza® by the company MONSANTO, or under the name Rhodopol® by the company RHODIA, is preferred.

As synthetic cothickening agents, there may be used for example polyethylene glycols and their derivatives, as well as the homopolymers and copolymers, crosslinked or otherwise, based on acrylamide or methacrylamide such as the homopolymers of 2-acrylamido-2-methylpropane sulphonic acid, the copolymers of acrylamide or methacrylamide and of

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methacryloyloxyethyltrimethylammonium chloride, or the copolymers of acrylamide and 2-acrylamido-2-methylpropanesulphonic acid.

The concentration of the cothickening agent in the cosmetic compositions according to the present invention is preferably between 0.05 and 2% by weight, and in particular between 0.1 and 1% by weight, relative to the total weight of the final composition.

A carrier capable of solubilizing the polymer constituents (a), (b) and (c) described above is used as cosmetically acceptable carrier in the cosmetic compositions of the present invention, and it is preferably an aqueous or aqueous-alcoholic carrier.

The cosmetic compositions of the present invention may contain, in addition, other ingredients commonly used in the cosmetic field and appropriate for the application envisaged. There may be mentioned by way of example of such additives for example colorants, pigments, perfumes, silicones which are volatile or otherwise, organomodified or otherwise, sunscreens, anionic, nonionic, cationic or amphoteric fixing polymers, different from those described above (such as for example polyvinylpyrrolidone), as long as they do not adversely affect the advantageous properties of the cosmetic compositions of the present invention.

The present invention is illustrated with the aid of the following example.

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Example

The aqueous-alcoholic hairstyling gels A, B and C are prepared which contain the following ingredients (in parts by weight):

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|  | A            | B            | C            |
|--|--------------|--------------|--------------|
| Fixing polymer <sup>a)</sup>                   | 0.2          | 0.2          | 0.2          |
| Acrylic thickening polymer <sup>b)</sup>       | 1.4          | 1.4          | 1.4          |
| Noncellulosic cothickening agent <sup>c)</sup> | 0.3          |              |              |
| Cellulosic cothickening agent <sup>d)</sup>    |              | 0.3          |              |
| Silicone <sup>e)</sup>                         | 0.2          | 0.2          | 0.2          |
| Ethanol at 96°                                 | 17.2         | 17.2         | 17.2         |
| 2-Amino-2-methyl-1-propanol                    | qs pH 7.5    | qs pH 7.5    | qs pH 7.5    |
| Water  | qs 100       | qs 100       | qs 100%      |
| <b>Viscosity<sup>f)</sup></b>                  | <b>2.540</b> | <b>1.480</b> | <b>1.535</b> |

- a) Ex-SDR-26<sup>®</sup>, branched block copolymer of butyl acrylate and (meth)acrylic acids which is marketed by the company GOODRICH
- b) Carbopol<sup>®</sup> Ultrez 10, poly(acrylic acid) marketed by the company GOODRICH
- c) Jaguar<sup>®</sup> HP 105, guar gum marketed by the company RHODIA
- d) Klucel EF<sup>®</sup>, hydroxypropyl cellulose (on average 22 mol of ethylene oxide and 23 mol of propylene oxide) marketed by the company AQUALON
- e) Mirasil<sup>®</sup> DMCO, polydimethylsiloxane marketed by the company RHODIA

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- f) Viscosity expressed in Pa.s, measured at 25°C using a rotary viscometer RHEOMAT 180, rotor No. 3, reading after 30 seconds.

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This example shows that the hairstyling gel A according to the present invention possesses a substantially higher viscosity than the comparative hairstyling gel C free of cothickening agent and containing, as sole thickening agent, an acrylic thickening polymer (Carbopol® Ultrez 10).

The comparison of the hairstyling gel A according to the present invention with the comparative hairstyling gel B containing an acrylic thickening polymer (Carbopol® Ultrez 10) combined with a cellulosic cothickening agent (Klucel®) shows that the replacement of a cellulosic cothickening agent with a noncellulosic cothickening agent spectacularly improves the viscosity of the hairstyling gel.

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